



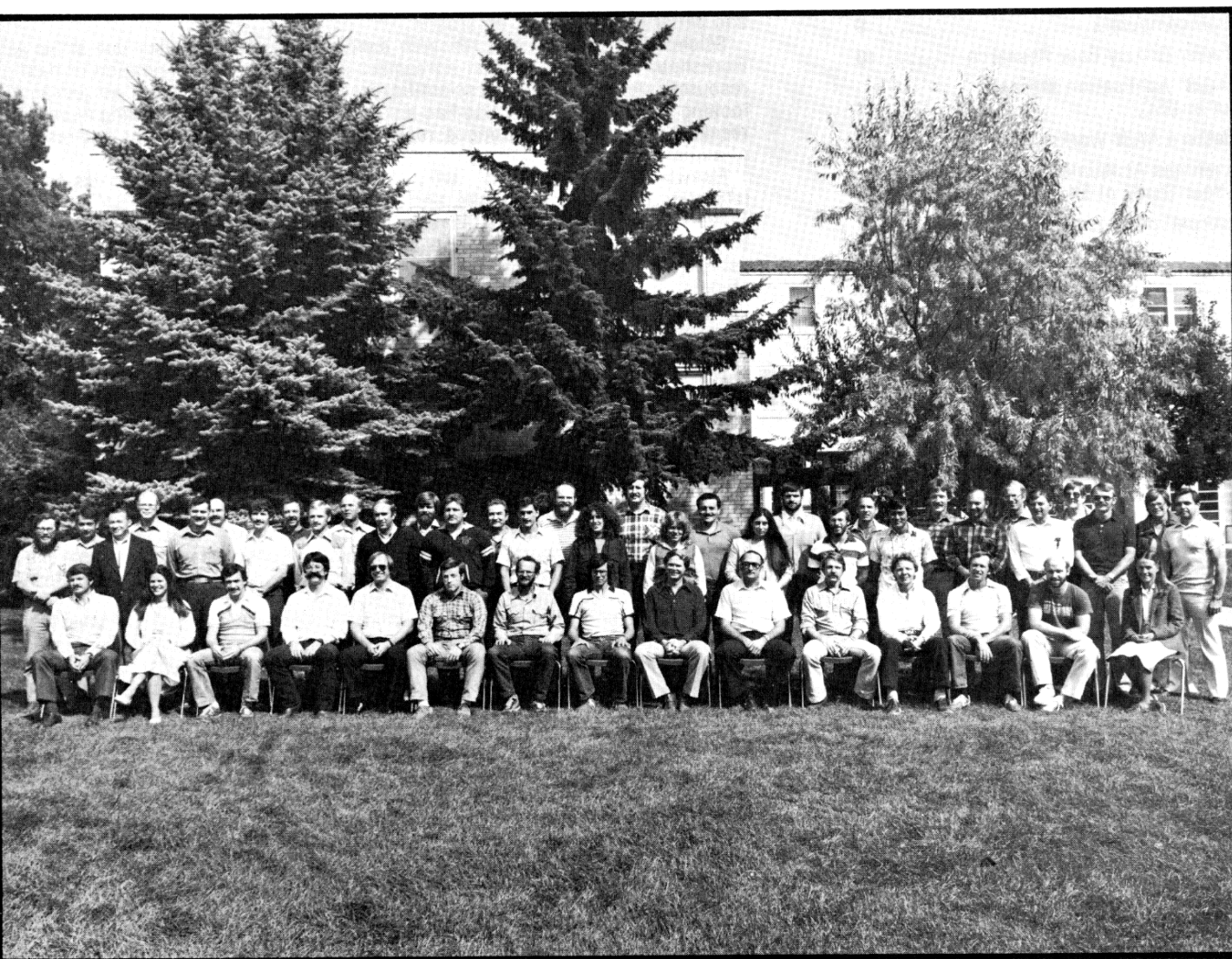
PARK SCIENCE

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A report to park managers of recent and on-going research in parks with emphasis on its implications for planning and management.

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Editor's Note:

"Interpretation through successful cooperation" was the theme of the Northwest RAIN (Northwest Region Association of Interpretive Naturalists) at their October 1982 workshop in Vancouver, Wash. Within the context of the fiscal restraints that encompass the entire field of natural resources, there are words of wisdom for science and management as well as for interpretation.

One workshop title especially spoke to the commonness of our joint professional dilemma — its title: "And I Also Interpret."

While it has been jolting to many, whose specialized training prepared them for a single task in a mosaic of natural resource management and interpretive tasks, the demand that people "double in brass" has its own special rewards, both for the individuals involved and for the systems in which they serve. The cross-disciplinary information and skill exchanges that occur when one person must perform in several areas and do several tasks, can be a binding force that makes for synthesis and better understanding all around.

Science and the scientific research methodology received their due at the AIN workshop. There was general agreement that the best interpretation of natural resources stems from the best scientific research available, but it was not just an "us looking at it" approach; it also had a strong component of "us looking at us." The research theme was two-pronged: research of subject matter content, and research of audience.

Elsewhere in this issue, Gary Machlis's presentation on cross-cultural interpretation appears. Machlis, sociology project leader of the NPS/CPSU at the University of Idaho, stressed his reliance on natural history techniques in studying behavior patterns among the various categories of park visitors. Instead of simply using questionnaires asking visitors what they feel or how they act, he assigns students to observe and make careful notes on the minute-by-minute behavior of visitors. The results of his studies have important implications for park managers, park interpreters, and concessionaires.

Research for content was the focus of another presentation by Leslie Wildesen, formerly with the U.S. Forest Service and presently in Washington, D.C. on an American Anthropological Assn. fellowship. She described the detailed research that went into her Portland State University course on historic bridges and ferries of the area, and included in her presentation a lively appreciation of the audience pitfalls that such a course might hold.

Context came through at the sessions as a most important part of interpretation — the weaving of specific subject matter into a presentation that has meaning for the audience. Increasing audience sophistication combined with decreasing park budgets poses an awesome interpretive problem, but not an insurmountable one. In cooperation among a wide spread of resource people lie many of the answers to both subject matter and audience understanding.

Roger Clark, project leader for Wildland Recreation Research at the Pacific Northwest Forest and Range Experiment Station in Seattle, indirectly endorsed the NPS/CPSU approach when he told conferees in his keynote address: "Cooperation is not a panacea for all problems facing interpreters, but many worthwhile objectives can be achieved by cooperation among managers, researchers, universities, interest groups, and visitors." Here again is expressed the belief that a wider range of input to the interpretive effort results in a broader context for understanding and cooperation.

One specific tool for moving ahead with this approach is the AIN's *Journal of Interpretation*, co-edited by Sam H. Ham and Machlis, both of the University of Idaho. The *Journal* deals specifically with scientific aspects of interpretation and how to bring the two fields into a more efficient, working focus.

The feeling at the workshop's end was that the highest quality of interpretation demands thorough knowledge of both content and audiences, and that many seemingly unrelated goals — of managers, of administrators, and of concessionaires — may be surprisingly well served if the tools of research are brought to bear on better interpretation.

37 Parks Participate In Natural Resource Management Training

By Ro Wauer

In the second State of the Parks Report (1981), most often referred to as the prevention/mitigation report, the Park Service outlined a strategy designed to address the numerous threats to park resources that had been described in the 1980 State of the Parks Report. That strategy included both immediate and long-range actions. The immediate activities consisted of the identification and ranking of Significant Resource Problems (SRPs) to identify the Service's most critical natural and cultural resource priorities. Long-range activities included (1) the reemphasizing of area Resource Management Plans as the primary vehicle for documenting resource threats and the mitigation actions required; (2) the design and development of a Resources Information Tracking System (RITS) to provide managers, planners, and scientists with a pertinent information base; and (3) a program to train four levels of Park Service employees in the philosophy and fundamentals of natural resources management.

Three of the training levels were implemented immediately. Natural Resource Management courses for Superintendents and Mid-level (park division chiefs) personnel had already begun, and two workshops (Natural Systems and Coastal Systems) for current Natural Resource Management Specialists were held in April and September 1982. Five additional workshops were identified and are expected to be implemented during ensuing years.

The fourth level of natural resource management training, and one that is expected to be the most important for the long-term protection of park values, is a new, innovative program designed to place specially trained Natural Resource Management Specialists into parks presently lacking the personnel and expertise to identify, assess and monitor threats and to prepare and implement scientifically-based prevention and mitigation plans. This training program is funded by special allotments to the participating regional offices for salaries and support costs. It involves a series of two-year training assignments which run one after the other and are expected to continue through 1990. The first of these started August 1, 1982, in 37 park units; the 37 trainees (see photograph) were selected on the basis of their qualifications to meet the requirements of the various recipient parks.

The trainees' first responsibility is the completion of an acceptable Individual Development Plan (IDP). Each IDP will include 35-plus components that may vary greatly in length and intensity, depending upon the specific park requirements and

the trainee's level of expertise and interest. As an example, the Cave Management component may last only a few hours for Bruce Rodgers, Assateague's trainee, but may last several weeks for Steve Chaney, Buffalo River's Natural Resource Management Trainee. Some components, such as Resource Management Plans, Vegetation Management, Exotic Animal and Plant Control, and Integrated Pest Management, will require considerable attention throughout the course of the training assignment.

All 37 of the trainees began their training at Ft. Collins, Colo., Sept. 8 to 17, 1982, when several of the 35-plus components were discussed. Most of these components were only introduced, and each trainee is expected to continue with the rest of the components during the follow-up activities as described in the IDPs. Topics discussed at Ft. Collins included environmental law, ecosystem maps, natural resource management planning, endangered/threatened species management, integrated pest management, public relations, and political realities. The Ft. Collins session was the first time all the trainees had been assembled. For many of the new appointees it was their first introduction into the purpose and format of the program.

All of the trainees are expected to be together again at least one more time, for a week-long sociological component scheduled at Texas A & M University in December 1983. Introduction to statistics and probability analysis for natural resource manager also will be included.

Although a good deal of the training activities is likely to take place outside of the trainee's home park, either at other parks that can provide on-site training opportunities, at a variety of other federal or state agency sites, or at other offices or institutions, all should be product oriented. However, each product should benefit the trainee's home park. And the trainee's curriculum must be sufficiently flexible to allow for day-to-day activities required in the operations of the home park as part of the completion of the ingredients outlined in the trainee's IDP.

The basic premise of the Natural Resource Management Trainee Program is to provide greater assurance for the perpetuation of park natural resources. In a sense, the program is training people in 37 parks to be resource ecologists. The trainees must learn the art of people management and at the same time understand and apply basic ecological principles that provide the building blocks for resource planning and decision-making. They must comprehend that "the first rule of intelligent tinkering is to save all of the pieces," accept the truth that "nature will win in the end," and utilize the concept that if "it ain't broke, don't fix it."

Letters to the Editor

Perhaps the most remarkable thing about the NPS/MAB international symposium and workshop on "The application of genetics to management of wild plant and animal populations" was that it occurred. If I had to write the head for a news story about the meeting, it would read, HIGH-RISK VENTURE SUCCEEDS. Consider that the ambient bureaucratic and fiscal climate can scarcely have favored growth of the idea of sponsoring a big meeting on a somewhat esoteric theme at a plush Washington hotel. Consider the problems of getting money and/or moral support from 30 sponsoring organizations and commitments from 60 major participants. Consider the logistics of staging the affair after all the basic arrangements were in place. Consider, above all, the questions that must always have lurked in the background: What if we gave a meeting and nobody came? What if it turns out that field biologists and population geneticists don't have anything much to say to each other? The mere fact of the meeting speaks volumes about the determination, dedication and diplomacy of Chris Schonewald-Cox and the other prime movers. That it ran almost flawlessly and accomplished many of its objectives was jam for the bees.

Typical of the crisply efficient operations, a list of all participants was distributed on the last day of the meeting. It shows that around 300 attended. I thought there were more than that in some of the general sessions, but maybe the mirrored walls of the Regency Ballroom accounted for that impression. Or, perhaps some chose anonymity rather than pay 50 bucks to register. In any case, enough people were there and also an adequate diversity. By my rough tally, 30 percent of those from outside the Washington area who were not on the program represented conservation groups, 22 percent were from universities and 17 percent from state or provincial conservation/fish and game departments. Attendance from NPS field areas was numerically robust, I counted 18 names. That handsome showing doubtless reflected the fact that the meeting was an approved NPS training session, thus escaping the travel-to-meetings stigma. By contrast, field attendance from the other federal agencies with major commitments to natural-area management was almost nil, four from the Fish and Wildlife Service and two from the Forest Service.

The germinal concept of the meeting, to speed the trickle-down (or trickle-across) of important ideas by bringing field biologists into contact with current population genetics theory, was an

exciting one — much talked-about, rarely attempted. It was also a bit tricky and more than a little subversive. We have, after all, pursued our empirical and intuitive ways of managing largely untainted by theory, and, besides, intellectual privation is considered good for the soul. At least, I presume it is, because it has become almost as hard for a field scientist to get to a technical meeting as it's said to be for a rich man to get into the kingdom of heaven.

The interest profile of this meeting differed from any other I've attended, possibly because it brought together such diverse people. At the usual scientific meeting, the level of attention tends to peak early and then to decay exponentially. My calculations, alas from a rather small sample, indicate that the mean LD₅₀ for listening to papers is reached on the third afternoon. Later speakers are likely to find themselves addressing empty chairs and a bored projectionist. The present meeting started slowly with good attendance, but not much feedback. The field folks and the high-powered theorists tended to circle warily, rather like a first meeting between partners in an arranged marriage. The constrained air vanished in the Wednesday afternoon sessions, mostly because people from state conservation departments began speaking up without being unduly worried that they might say something silly. The eventual greening of the meeting owed a lot to the persistent Wyoming biologist concerned about his tiny fragmented populations of bighorn sheep; to the man from Missouri who wanted to know whether he should mix or match his relict groups of prairie chickens; to the lady determined to find the genetically correct procedure for reintroducing river otters into Colorado.

After that, it went pretty well. More and more people were willing to wing it with questions and comments; the geneticists discovered theoretical interest in some field problems that were raised and began arguing with each other; and, at least on occasion, the meeting became the sort of intellectual rough-and-tumble that its organizers must have hoped it would be. Some of the best-attended and most animated workshop sessions occurred in the depths of the Friday afternoon. One sensed that the peak of useful interaction was still ahead; that the meeting could profitably have gone on for a couple more days. For me, an aspect of the unfinished feeling was the heavy load of *l'esprit de l'escalier*, the bright remarks one thinks of too late, that I carried away from the meeting. I wish I'd challenged some of the unfunny witticisms about subspecies; why didn't I keep asking until I really understood the concept of effective

population size?; if only I had . . . In short, it was an excellent conference.

Looking back from six weeks later, the glow of course has faded and few of us have kept our solemn self-promises to study the short course in population genetics provided in the handouts. We confront the same population management problems, perhaps with somewhat deeper understanding, and newly aware that no magic answers exist, in genetics or elsewhere. We learned, if we didn't already know it, that geneticists command increasingly powerful techniques for seeing the genome beneath the skin and that the view obtained can yield critical population data. But, the techniques are no more available to most field biologists than they ever were. What we need are working relationships. Contacts at the meeting encouraged belief that population geneticists could become interested in some of our field problems. But, it's not likely to go much farther than that without specific programs, funds and more meetings.

So, what was accomplished in those five days at the Hyatt Regency, and what, if anything, does it portend? While pondering those questions, I kept remembering a bit of doggerel from the deep past, a fragment from a piece which, along with "The Boy Stood on the Burning Deck" and other old rousers, used to be a staple of grade-school dramatic recitations. To avoid being classified as an utterly Cretaceous fossil, I want to make it perfectly clear that this was just something I heard from the older kids. Anyway, the poem, Southey's "The Battle of Blenheim", has an old soldier describing the battle to boys and it concludes:

"But what good came of it at last?"

Quoth little Peterkin.

"Why, that I cannot tell", said he,

"But 'twas a famous victory."

Seen as an isolated intellectual event, the conference on application of genetic principles to population management was a resounding success, unique in the slim annals of NPS, "a famous victory". Whether any abiding good will come of it, I cannot tell. One can easily imagine another, more specific, genetics workshop and see other areas of biology where it would be useful to build some bridges between theorists and empiricists. Is it realistic to think of such things? Well, it happened once. I'm glad I was there to see it.

Bill Robertson, Research Biologist
South Florida Research Center
Everglades NP

To The Editor:

I was able to attend the symposium and workshop held in Washington, D.C. in August on "The Application of Genetics to the Management of Wild Plant and Animal Populations" because of the note on the advance brochure which stated that the NPS considered it appropriate training for individuals with resource management responsibilities. As a result, I benefited from the best training session or conference I have attended in 12 years as an NPS Research Biologist. I found the organization to be superb, the speakers excellent, and the subject matter highly relevant to my interests. The key to success was attracting speakers from among the top scientists in the field. Although the organizers filled the 5-day schedule with a potentially exhausting array of speakers and workshops from 8 A.M. to 6 P.M., I was rarely, if ever, bored. And I have never attended a conference where reaction from my colleagues was so positive. My NPS colleagues and I felt a mixture of pride and amazement that our agency had played a major role in putting on such a high-quality and useful session.

NPS research biologists are usually expected to carry out a research program related to managing park resources and to advise park superintendents on a wide range of natural resource topics, such as (in my experience) species reintroductions, management of rare species populations, control of exotic species, etc. Resource managers encounter an amazing variety of topics, many of which they may be ill-prepared to handle. Most of us had fairly broad biological training in graduate school, but have since been barely able to keep up with the rapidly proliferating literature in our own often narrow fields of expertise. When asked to give advice on some topic outside our field, we often don't even know whom to approach for help or what questions to ask. Highly specialized training such as that provided in this genetics conference can go a long way toward getting us up to date and reestablishing and maintaining credibility for the NPS in the field of resource management.

I don't mean to imply by my praise that the field of conservation genetics is sufficiently well-developed that we were spoon-fed solutions to problems. Any conference trainees expecting easy solutions must have been sorely disappointed. Actually, much controversy was brought to the surface. Conflicting statements by proponents of contrasting schools of thought were commonplace. Eminent scientists often seemed shocked that solutions were expected without years of research, and experienced some frustration that lack of sufficient data often makes it necessary to offer an educated guess if one offers a solution at all. All that could be offered were the

elements that should go into decision making. Even though new sophisticated and expensive research (e.g., electrophoretic analysis of allozyme variation) to provide more information for high-resolution decision making may be possible in few cases, such research can sometimes be extrapolated from related organisms. Certainly one must assemble all available information for the decision making process.

Much information gained at this conference will improve my ability to carry out research and advise Haleakala's superintendent. I have a better feel for the genetic limitations which very small, isolated populations of Hawaiian plants and animals may have and the potential positive and negative results of "tampering with" gene pools by transplanting. I can now better develop a research approach to a situation in which elimination of pollinators may result in drastic reduction of seed production or seedling vitality. I am impressed by the potential of exotic species with limited genetic variation because of small founder populations to undergo a shift from a "benign" exotic status to aggressive invasion of native vegetation after a long period because of introduction of new genetic variability or reorganization of existing variability. *Schinus terebinthifolius* in Florida seems to be an excellent example from my experience. This aggressive exotic tree was present in southern Florida for nearly a century before a population explosion in the 1960's which threatens native pine forests, mangroves, and other vegetation. One should beware of apparently innocuous exotics — especially trees and shrubs — in ecosystems such as those of southern Florida and Hawaii which are highly vulnerable to invasion by exotics.

Lloyd L. Loope
Research Biologist
Haleakala National Park
Makawao, Maui, Hawaii

Briggle Retrospective Covers 30 Years of Park Management

By Jean Matthews, *Park Science* Editor

"Let's kind of set a tone for this . . . I've gotten into the habit over the years of looking at things in perspective, and I'd like to start by taking you back to the early 1950's when I was a young ranger in Yellowstone National Park."

The scene was Mount Rainier Superintendent William J. Briggle's office in the new Park headquarters building — a structure that might have sprung up and grown out of indigenous materials on natural energy, so perfectly site-adapted as to be almost invisible in its leafy off-the-road setting.

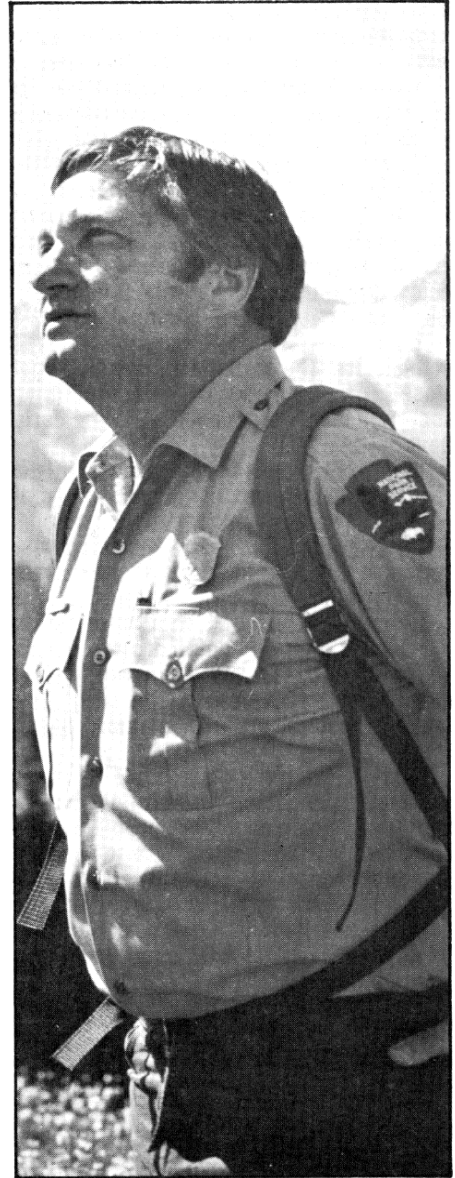
The subject was the relationship of research and park management, and in addition to a probing reporter, Stan Schlegel, resource management specialist, and Joanne Michalovic, the new resource management specialist trainee out of the Denver Service Center, were present.

"In 1949 I was a young park ranger, stationed in Theodore Roosevelt National Mem. Park in North Dakota — trained under an extremely competent superintendent — Allyn Hanks. The mandate for Theodore Roosevelt, a new area in the System, was basically to establish our presence and start learning our responsibilities. We knew we had antelope and prairie dogs and burning underground coal mines, and our resources for finding out any more were limited to the observations and notes you made from the saddle of a horse, the seat of a pick-up truck, or your own two feet.

"The superintendent was always asking us 'What did you see? Where are your notes?' We weren't sure at first whether he was just checking up on us or if he really cared. Very shortly we found out he really cared."

The notes, it turned out, formed the "glue" for the superintendent's annual reports. And what kind of science did these reports reflect?

"There were no scientists in the park then — no research as such. But from careful, caring observation, done by the ranger and historian and recorded in their notebooks, we were able to put together a pretty good picture of the natural or cultural resources. The management decisions that grew out of this situation were extremely pragmatic. For instance, we did *not* reintroduce the buffalo that had once been part of the area. We didn't do it because such a move at the time would have created a whole bunch of problems



Bill Briggle in his chosen habitat, still believes in management that "touches the resources."

with surrounding ranchers, and we didn't need more problems."

Was this a typical slice of the National Park System in the Fifties?

"Not really. Yellowstone, where I went next, was staffed with biologists, most of whom were studying the elk. Park rangers had, in the past, been sent out to shoot

Briggle (continued)

coyotes and mountain lions, the natural predators and pruners of elk populations. The biologists made a strong case against this tactic, but the early management errors had created an irreversible situation and the elk population explosion was inevitable."

Has research and management been able to catch up and overtake the results of early mistakes? Are we still behind, even with, or ahead of our problems these days?

"I think Yellowstone is pulling ahead. In the early days, the park's boundary was a firing line. With ranches surrounding the park, rangers were doing elk and buffalo reduction and that was pretty much it, so far as taking care of the game was concerned. Grizzly bear management was just starting to be discussed and didn't get much attention until the late Sixties and early Seventies. Then biologists started doing census studies. They got interested in the bears. The garbage dumps didn't get closed off until Jack Anderson (then superintendent) stopped that in the early Seventies.

"But I could see the beginning, in the early Fifties, of the coming together of research and management at Yellowstone. The interpreters and the rangers together began to see the need for more correct information about the resource. The superintendent needed that information for professional and political reasons—so he could move away from hip pocket decisions and start selling the management program in soundly based ways.

"The decision-making today is much more sophisticated. It's broader-based, and its sights are on today's problems with an educated eye on where a certain management course probably will put the park tomorrow and the day after. The proposal to kill mountain lions in Carlsbad Caverns and Guadalupe Mountains NP is a good example."

How helpful is the experience gleaned from a stint at one park when it comes to being assigned to another area with a whole new set of problems?

"The specifics change, of course, but the System as a whole reflects a growing recognition of the usefulness of organized research in arriving at management decisions.

"I was struck with this steady growth in the role of science when I moved to Sequoia/Kings Canyon NP, where the problems were different but where management again was turning to research for viable alternatives. The problem at Sequoia/Kings Canyon was twofold: 1) the park's close proximity to Los Angeles, and 2) unregulated use of the back country.

"Lowell Sumner was the resident biologist at the time, primarily there to study deer. But increasingly Sumner's

research drifted toward the back country management problem, and together with two superintendents — first, Eivend Scoyen and then John Davis — research and back country management became a science/management thrust.

"By 1964-65 this effort had resulted in the first formal back country management plan the National Park Service ever had. It eventually became the prototype for the Service and is the basis for today's back country work."

Would you date the beginnings of a formalized research/management team approach at around that time then?

"The year would vary with the park area, but overall I would say that by the mid-60's, the whole System was pretty well into organized research as a recognized partner in the management operation. We had begun to set up monitoring programs in many places. No longer was it a matter of a ranger riding by once or twice a year and making a subjective observation. It was measured plots, and building enclosures, and photographic records. It was objective baseline measurements and monitoring. And yet, as good as all this is, and as necessary, still there is the need for what I call 'an eye for it.'

"By that I mean that there is more to scientific management of park resources than the learning that comes from textbooks. The new park scholars still need the old park hands. You can't find in science alone all the ingredients for a politically valid judgment."

Do you think that superintendents and rangers and resource management people are staying in one area long enough to learn the ropes and do the optimum job?

"Up to 1976 I think the answer was No. We were expanding too fast and we were jumping all over the map trying to cover all the new bases with the same number of players.

"But now that the growth of new areas is restricted, field personnel aren't moving as fast as they had to prior to 1976."

Schlegel: "The first resource management specialists came into the parks just 10 or 12 years ago, and that was the time when the rangers began to drift away from the resource management field. Rangers were moving into implementing what the resource specialists were reporting as needed to be done. The visitation boom pushed rangers more heavily into the visitor management area."

"That's right, Stan, and at the same time universities were getting active in park resources. Take the fire research in the redwoods. Through the work done by university scientists, we found we should be letting fires run, to clear out the undergrowth and prevent the build-up of ground fuel that could catch and kill the giant trees. We had had the best intentions, but our fire prevention efforts — like our elk predator kills — had been wrong.

"Good research put management back



Joanne Michalovic, resource management specialist trainee, was selected from the Denver Service Center to be stationed at Mount Rainier NP for the two-year training stint. Michalovic is a Long Islander (NY) with an interdisciplinary degree within the natural sciences and a master's degree from Washington State University.

on the right track, but initially it was tough on management in general. They were skeptical and they had to overcome this skepticism before a mutual confidence could take root.

"I think we've made that step now. Management does have confidence in research, and we're showing it all over the System — not just in the acquiring of new knowledge (such as involves the elk herds here in Mount Rainier), but in beach dynamics on the Eastern seaboard, exotic goat management in Hawaii, the water management system in the Everglades, and other similar problem areas where old notions and decisions have had to turn 180 degrees around. That's where it's been toughest."

Would you characterize this turnaround as a Servicewide phenomenon?

"It probably was, basically, but without any real formalization. There wasn't much good communication in those days — no

coordination of effort or information exchange.

"We didn't have RMPs then. Sure, we had fire and back country management plans, but they weren't overall resource management plans. The plans were in people's heads, but they weren't tied to manpower and budget and they weren't on track.

"Today's RMP is directly tied to budget. And in 1976-77 when I was Deputy Director of the Service there was no management oriented research funded unless it was identified in the RMP. I've heard it called 'Briggle's Law.'

What do you see as the current status of park management?

"People with experience in the field, who know the resource, are not as evident today in policy positions. Therefore, they need educating. If you get a 'no' to your request, then sharpen your pencil and your presentation. Try to gain understanding. Fix your sights all the way to OMB and the Appropriations Committee. We have to be more articulate, do our homework better, be more convincing."

Do you have any advice as to how to do that?

"One of the most important ways is to educate your public. And do it *before* they get to the parks. Unfortunately, the outreach program has been cut. For years we've concentrated our interpretive efforts on describing the flora and fauna of the parks. Our captive audiences haven't been advised of the problems and opportunities in parks . . . only their glories. Mitigation of *people impacts must* be handled.

"Politics and resource management are inextricably interwoven. We must have better communication with people in the political arena so they can help advise management about direction and ways of operating. Going blindly about our mission without regard to the sociological and political effects can bring all resource management to a screeching halt and everyone can come unglued. Managers must be politically astute if they want to accomplish their mission, even to survive. Management can be awfully right and, at the same time, awfully wrong."

Can sociological research help management tread this delicate path?

"Sociological research will help management get over the idea that people can be *regulated*. Compliance comes from convincing people that it's *the thing to do* . . . not something they have to do so long as Big Brother is watching them.

"But let me say one thing more — to the managers. Never let the absence of science-based answers stand between you and what common sense advises you to do. Remember that as a manager *you* are ultimately responsible for the resource. Three imperatives for this task are experience, common sense, and the courage to take risks. When common

sense dictates 'move,' you must *move*!

"To the scientist, I say: 'You have to be sure of your findings, and willing to stand by your advice. If your superintendent is called into court to defend his decisions then you must be ready to march into court with him, and stand on your data.'

"There is no time to sit on past laurels. We must move inertia and then move beyond it — thinking *ahead* in an orderly planning process."

"Michalovic: the new RITS approach should help bridge the information gap between parks."

What must we do to improve resource management capability?

"You might ask around among the parks about what impact the publication *Park Science* is having. Is it a useful tool. Are the *rangers* using it? Do they see it as helping them do their jobs better?

"I see the park rangers today moving away from resource management — their early role — and into law enforcement, search and rescue, specialization skills. In ranger training, the large block of time is for law enforcement. Nothing like the same amount is devoted to resource management and resource appreciation.

"I can't blame the individual rangers. To them, that appears to be the glory road today. But if the park rangers are allowed to lose interest in the resource, and thus the confidence of the park manager, then the parks are in for difficult times in the years ahead. Let's get back to the basics! It's the only way if we want to be successful and survive!

A deeply probing analysis of NPS policy for managing vegetation in National Parks is carried in *Environmental Management*, Vol. 6, No. 2, pp. 109-122. In this article, Thomas M. Bonnicksen and Edward Stone argue that the Park Service has failed to recognize the significance of changes in the vegetation that occurred after fire was excluded and of the "unnatural vegetation" that now exists and that will be perpetuated if the fire process is simply renewed.

Bonnicksen is assistant professor of forestry at the University of Wisconsin, Madison, and Stone is professor of forestry at UCal, Berkeley.

The article raises a plethora of pertinent questions, among them: "Is reducing fuels acceptable as the only or principal objective? Are fire-induced changes acceptable so long as fuels are reduced? What standards should be used to judge if these other changes are desirable or not? If reintroduced fires are used and natural

Davidge Opens GWS Conference

Ric Davidge, special assistant to the Assistant Secretary for Fish, Wildlife and Parks, told the opening session of the George Wright Society Conference on Protection of Cultural and Natural Resources:

"If there is any programmatic act that should have absolute academic and professional integrity, it is the National Park Service science program."

Davidge addressed the conferees at their opening session Oct. 18, 1982, in the Department of the Interior auditorium.

"The last real mission statement for science was in Ron Walker's administration," he said, "and it presents a challenge to this Administration. We want to look at the structure of the science program — how it interfaces with management — and how we can better interject science services into resource management.

"The hallmark we are looking for is common sense — good, down-to-earth, feet-on-the-ground activity. I'm convinced we can do a much better job than we're doing now."

Davidge cited the Everglades NP as one of the most threatened parks in the System and said, "Morally, we should be dealing with these problems and the fact is we don't know too much about them." He urged National Park scientists to interface with the science services of other Federal agencies and also state and local agencies that can supply pertinent scientific information.

The Strategy Conference recommendations will be carried in their entirety in the George Wright FORUM.

fires are allowed to operate freely, at what future time, and upon what criteria will the Park Service declare an ecosystem as now "natural?"

The article presents two philosophies: one, to reintroduce prescribed and natural burns and then simply declare whatever results as a natural ecosystem, and the other, leave the ecosystems alone and allow them to change in whatever way nature dictates — "beginning today."

The authors plead for consideration of unanswered questions and for achievement of widespread agreement based on unambiguous, quantifiable criteria, rather than on "fuzzy undefined concepts like dynamic equilibrium."

The paper presents five alternatives that reflect both philosophies, and then adds a sixth that the authors think spans the two points of view . . . "providing a middle ground that can serve as the beginning of a compromise."

Regional Highlights

Technical Report PSW-58, Berkeley, CA available from the Pacific Southwest Forest and Range Experiment Station Forest Service.

* * *

The biannual report (#16) of the NPS/Cooperative Park Resources Studies Unit at the University of Nevada, Las Vegas, covering the period from Jan. 1 to June 30, 1982, is now available from Charles L. Douglas, senior research scientist and Unit leader. Six studies at Death Valley NM are described, two at Lake Mead NRA, one at Joshua Tree NM, and one at the San Gabriel Mountains, California. Subject matter includes several aspects of bighorn sheep ecology and behavior, burro-small vertebrate interactions, and floristics and vegetation of the Black Mountains.

Mid-Atlantic Region

An *Overview of the FY 82 Mid-Atlantic Region Science Program* has been produced by the MAR Division of Natural Sciences. The research/resource management report describes monitoring and research efforts at Shenandoah NP in the areas of air and water quality (with support from the WASO Water Resources Division, the U.S. Geological Survey, and the WASO Air Quality Division), and a major effort through the USF & WS Cooperative Wildlife Research Unit at Virginia Polytechnic Institute and State University (VPI) to examine the seasonal movement patterns, identifying seasonal habitat preferences, estimating bear density and reproduction, and relating all factors to management activities.

The Overview lists the following additional studies at Shenandoah and elsewhere in the region:

At Shenandoah NP: "A Hiking Trail System Model for the Central District of Shenandoah NP," and a proposal to establish a Shenandoah NP Field Research Center;

At Assateague Island NS: "A Study of the Behavior and Ecology of the Feral Ponies, Sika Deer and White-Tailed Deer Within Assateague Island NS," and "Frequency Spectrum of Oceanic Overwash Events on Assateague Island NS: Implications of Natural Disturbances for Habitat and Community Development;"

At Delaware Water Gap NRA: "Rare and Endangered Plant Species Within the Delaware Watergap NRA," "Factors Affecting Gypsy Moth Egg Survivability," and "Parasitism in Gypsy Moth Larvae Populations from the Watergap NRA, Gettysburg NMP, and Catoclin Mountain Park;"

At Independence NHP: Several studies

Water Resources Lab

A number of publications now are available from the Water Resources Field Support Laboratory (WRFSL) with special significance for NPS scientists and resource managers: WRFSL Report No. 82-1, Status Report: Acid Rain Research in the National Park Service, 1982; Report No. 82-2, Guidelines for Water Quality Program Development in NPS Areas; Report No. 82-3, State of the Art in Road Salt Deicing; and Report No. 82-4, Evaluation of NPS Participation in the National Atmospheric Deposition Program I, An Overview.

A conference session, "Water Management in Park and Recreation Areas," held in Lincoln, Nebraska in May 1982, will be available shortly as WRFSL Report No. 82-5. The conference was sponsored by the Water Resources Systems Committee of the American Society of Civil Engineers and was part of the larger conference on "Managing Our Limited Water Resources." All WRFSL reports are available from the Lab, NPS, 107C Natural Resources, Colorado State University, Fort Collins, CO 80523

Pacific Northwest Region

A new journal, *Women in Forestry*, published jointly by the College of Forestry, Wildlife and Range Sciences and the Laboratory of Anthropology at the University of Idaho, will deal with ideas and information written for, from, and about women. It will serve as a medium of communication among women in natural resource fields and aims at assisting them in reaching their professional goals. Four issues per year will cost non-students \$15; students, \$10. Dixie L. Ehrenreich, editor, is at the Anthropology Lab, University of Idaho, Moscow, ID 83843.

* * *

Olympic NP and the Peninsula College fisheries technology program will sponsor a symposium, "The Olympic Wild Fish Conference," at the College in Port Angeles, Wash., March 24-26, 1983. The conference will allow scientists, resource managers, and the public an opportunity to focus on the current status of Olympic Peninsula native populations of salmon and trout stocks, and on the research, policies, and management pertaining to them.

Southeast Region

Abstracts of a Colloquium on long-term ecological research in terrestrial and marine biology of the Virgin Islands, held at Virgin Islands NP in July 1982, are now available from research biologist Robert Brander, Virgin Islands NP, P.O. Box 7789, Charlotte Amalie, U.S. V.I. 00801. The papers deal with water quality, climate, and exotic and human impacts.

* * *

Forty-six research projects covering a wide range of topics in the biological, physical, and social sciences in the southern Appalachian region are described in a publication stemming from the *Eighth Annual Scientific Research Meeting* held in June 1982 at Great Smokey Mountains NP. The abstracts are available from Uplands Field Research Lab, Great Smokey Mountains NP, Gatlinburg, TN 37738.

* * *

A conference on Maintenance of Biological Diversity in the Lesser Antilles, to be held in conjunction with Biosphere Reserve dedication ceremonies at Virgin Islands NP, is scheduled tentatively for May 1983. The conference will focus on maintaining biological diversity in the Lesser Antilles and on generating recommendations for the upcoming world meetings on maintenance of biological diversity.

Western Region

An article describing significant inaccuracies in reporting wilderness permit data appeared in *Environmental Management*, Vol. 6, No. 4, pp. 329-335, under the by-lines of David J. Parsons and Thomas J. Stohlgren of Sequoia and Kings Canyon NPs and James M. Kraushaar of the University of Vermont School of Business. Data from Sequoia & Kings Canyon show that changes in visitor plans resulted in an over-reporting of total persons by 8 percent and of visitor nights by 23 percent.

Parsons also authored a summary synthesis of "Fire Management and Vegetation Effects in Mediterranean-Type Ecosystems as part of the Proceedings of a Symposium on Dynamics and Management of such ecosystems. The latter is carried in the USDA General

being conducted by the Morris Arboretum, including "Trees for Urban Parks — A Guide for the Selection and Culture of Trees in NE Cities;"

And studies specific to New River Gorge National River, Gettysburg NMP, Valley Forge NHP, and Allegheny Portage Railroad NHS.

National Capital Region

A growing outbreak of racoon rabies in West Virginia and Western Maryland is responsible for the implementation of an urban racoon ecology study that had been drafted by Dave Manski of the Ecological Services Lab. NPS is working with the National Zoo, the University of D.C., and the Communicable Disease Center in Atlanta on the plan, which now involves trapping, radio collaring, and inoculating the racoons in Washington, D.C.'s Rock Creek Park.

Under the direction of Kay Thomas and Jim Sherald of the Ecological Services Lab, a herbicide, cacodylic acid, has been injected into Kudzu, wisteria vines, and English ivy plants in Rock Creek Park and on the George Washington Memorial Parkway in an experimental effort to control these exotic plants. Salt water treatments, flaming, cutting, and severe pruning methods also have been implemented.

In February 1983, the National Capital Region will complete the third year of its three-year Integrated Pest Management contract. According to Dick Hammerschlag, chief of the Ecological Services Lab, what has evolved over the life of the contract is a philosophy and a personnel set-up that has moved away from a pesticide based management process and toward an analysis of alternative strategies with strong emphasis on biological controls, better site management, and improved understanding of the ecology of pests.

Southwest Region

Oriental (Asian) clams were found in Bull Bayou at Hot Springs NP. Population densities as high as 84 per square meter were reported. However, research biologist Gerry Hoddenbach says clam specialists report 2,000 to 5,000 per square meter have been known in Arkansas. The clams are a specific problem not only because of their proclivity to cover stream bottoms and directly affect benthic organisms and indirectly affect other aquatic life, but also because clam larvae

can penetrate irrigation pumps, pipelines and other water conveyances and cause mechanical problems. Canals have been known to be all but blocked by colonies of clams that cause flooding problems during times of high water. There are few, if any, controls for the clams.

Unit archaeologists returned to Point Reyes NS for the first two weeks of October to complete underwater remote sensing operations in Drake's Bay. The session emphasized the use of side scan sonar as the primary inventory tool used in association with a magnetometer and sub-bottom profiler.

A contract with Harvey, Stanley, and Associates, and environmental consulting group, has resulted in the capture and radio-collaring of one mountain lion at Carlsbad Caverns/Guadalupe Mountains. While no others have been captured in the lion study there, a professional lion hunter recently killed three of the animals on adjacent ranch land.

The Rio Grande Fisheries Recovery Team in Santa Fe met on Nov. 15-16 to discuss the recovery plans for the Big Bend NP Gambusia. The decision was to try to rehabilitate one of the natural springs that has been altered, by drilling a well designed to enhance the natural artesian flow. Chief Scientist Milford Fletcher said the Gambusia population is more than adequate to justify the effort and he expected the springs alteration to be accomplished within the next year.

Rocky Mountain Region

Victor Jackson of Zion NP is the winner of the Freeman Tilden Award for outstanding contribution to interpretation by an NPS interpreter. The announcement was made by the Washington Office on Oct. 27.

Pacific Northwest Region

An inexpensive but handsome green-on-cream pamphlet defining the NPS Cooperative Park Studies Unit at the University of Washington has been produced by the Pacific Northwest Region of NPS. The flyer gives a short history of the WU Unit, and a brief outline of the Unit's research, academic programs, and extension programs. The CPSU concept given is "a means by which the NPS and cooperating universities mutually strengthen their ability to conduct research, improve teaching and training opportunities, and apply natural and social sciences information to improve the management of natural and cultural resources."

OSU Offers Course In Microcomputers

An intensive short course on Microcomputer Applications for Resource Managers will be held March 22-23, 1983, at the School of Forestry, Oregon State University, Corvallis, according to Ed Starkey, research biologist and leader of the NPS/CPSU at Oregon State.

The workshop is designed for those with little or no experience with microcomputers, and will focus on applications rather than theory. Participants will be introduced to the general operation of microcomputers and will have ample opportunity for hands-on experience with a number of commercially available programs with a variety of applications.

Specific applications will include statistics, data base management, on-line communication networks, word processing, and budgeting. A fee of \$190 includes all course materials and computer time. Contact for the course is Conference Assistant, School of Forestry, Oregon State University, Corvallis, OR 97331

TEN YEARS IN THE MAKING . . . A Landmark Study in Wildlife Ecology! With these words, Macmillan Publishing Co., Inc., 200D Brown St., Riverside, NJ 08370, trumpets the publication of Doug Houston's **The Northern Yellowstone Elk: Ecology and Management.** "This book is one of the first indications that an objective and experimental approach is entering the field of wildlife management," says A.R.E. Sinclair of the University of British Columbia in the book's foreword. Richard S. Miller of Yale says the book "sets a high standard of scholarship and science . . . has done a good job of sorting through a conflicting array of data that has generated a classic management controversy."

Glacier Grizzly Bear Research

By C.J. Martinka

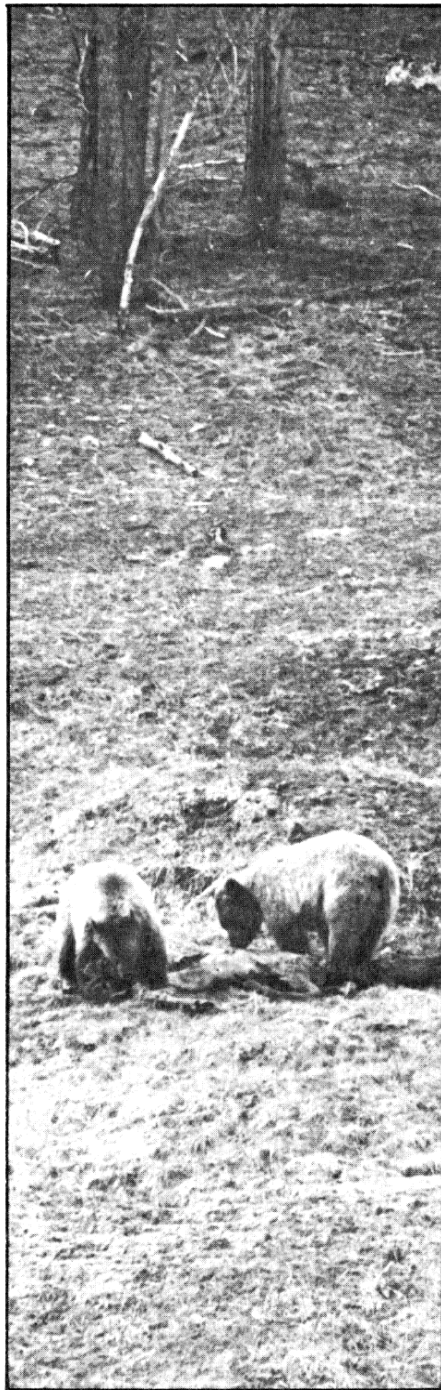
Editor's Note: Newspaper clips from all over the United States are increasingly sprinkled with headlines such as "Grizzlies Seen As Imperiled in Wyoming," "Sixth Grizzly Kill May Lead Officials to End Baiting," and "Grizzly Populations Dwindled Rapidly." The New York Times, the Jackson Hole Guide, the Great Falls Tribune and the Washington Post are representative of the wide range of publications devoting space to the subject. In view of this drumbeat of public concern, Park Science asked Clifford Martinka, NPS research biologist at Glacier NP, to update his 1981 statement for the U.S. House subcommittee on Public Lands and National Parks. The following is his response.

Grizzly bears are part of the native wildlife heritage of Glacier NP. Servicewide policy and park plans recognize that scientific information is necessary for proper management of this unique natural resource. Occasional aggressiveness by bears toward park visitors emphasizes the dimension of human safety as part of the need for credible knowledge about the bears. In addition, their threatened status in the contiguous United States requires a factual data base if recovery is to be successful.

Park management has responded to grizzly bear research needs by integrating the capability for field studies into the resident research program. Research activity was initiated in 1967 after grizzlies caused the deaths of two backcountry campers. Study goals included the collection and evaluation of quantitative data on population status, ecological relationships, and management of the bear population. Field data collection was stressed but it quickly became evident that management records were an invaluable source of trend information. University contracts provided topical studies while liaison with other agencies and the scientific community assured that data from regional studies also were available to park managers. This research framework continues; its intensity is largely dependent upon annual support funding levels.

Research findings have been reported in management documents, at interagency meetings, at scientific gatherings, and in several dozen reports, articles, and technical papers. Significant results may be summarized in five categories as follows:

1. **Population Status.** An estimated



Two young bears on a bare meadow finish the remains of an elk carcass.

population of 201±23 grizzlies (1 per 8 square miles) inhabited the park from 1967-76. An average of 34 cubs was produced each year but population levels remained relatively stable over the 10 year period. Natural mortality and dispersal from the park are important factors contributing to population stability. Population data collected since 1976 suggest continued stability; the entire package is being used as baseline data in the regional recovery plan.

2. **Population Ecology.** Park habitats provide a variety of high quality food and cover for grizzlies. Seasonal use of these habitats is relatively predictable and several significant concentration areas have been identified. Habitat use patterns have provided the foundation for two research projects, the results of which provide planning tools to minimize encounters between grizzlies and park visitors.

3. **Grizzly/Visitor Interactions.** Grizzly bears have been involved in 25 confrontations that resulted in 28 visitor injuries and 6 deaths from 1910-80. The number of confrontations is closely correlated with park visitation levels. However, rate analysis during recent decades suggest that confrontations may actually be increasing faster than park visitation. Changing bear behavior is now being investigated as a possible contributor to this trend.

4. **Effects of Management.** Grizzly bear losses resulting from management activities totalled 47 from 1951-82. Annual losses followed the same increasing trend as visits and confrontations. However, losses remain less than one percent of the estimated park population and are considered to be within biologically acceptable limits. It should be recognized that mortality adjacent to the park may involve individual bears from the park population and that total losses are likely somewhat greater than one percent.

5. **Information Systems.** The collection and use of credible information is an essential element of grizzly bear management. Accordingly, the park research effort expanded its data processing program to include development of a management information system. Result was a program which is now incorporated into a servicewide bear information management system (BIMS).

Current research in Glacier continues to emphasize grizzly bear studies. The staff recently was expanded to include a Wildlife Biologist (Kate Kendall) whose sole responsibility will be field bear research. Two principal topics are being addressed:

1. A complete review of existing population data is being conducted to assure that previous analyses accurately reflect population conditions and that existing data sources are efficiently utilized.

2. The effects of food stress on bear behavior are being studied along with the distribution of important foods and habitats within the park. This work is considered requisite to management plans for further separating grizzlies and park visitors.

The issue of behavioral conditioning also is being considered, but inherent complexities have demanded a cautious approach.

It is generally agreed that grizzly bear

management requires a more substantial data base than currently exists in the park. Research plans therefore include some major degree of attention through the 1980's. A program to address the most pressing needs is expected to include the following:

1. Continued efforts to monitor grizzly bear population trends with an emphasis on refinement of techniques for routine collection and evaluation of biological data.

2. Development of a more comprehensive data bank of park visitor statistics, especially numbers and trends of hikers.

3. Completion of an inventory and mapping of park habitats including

SAGIS¹ Application Worked Out At DSC

Editor's Note: In the Winter 1982 issue of Park Science Harvey Fleet, Chief of the Science Section at the Denver Service Center, discussed activities in digital cartography (computer mapping). The following article describes a recent application.

The Division of Natural Science, WASO, recently asked the Remote Sensing Section, Denver Service Center, to discover the availability of aerial photography and Landsat imagery for potential use in a Parks-As-Islands study

of 10 NPS Biosphere Reserves.² An appropriate search request to the National Cartographic Information Center (NCIC) produced a rather awesome stack of computer listings containing thousands of accessions and their associated

¹Systems Applications Group Information System

²Everglades, Yellowstone, Great Smokies, Glacier, Olympic, Big Thicket, Big Bend, Sequoia/Kings Canyon, Organ Pipe, Rocky Mountain.

Continued on Page 12

NPS Director Russell E. Dickenson, in a major address at Oregon State University on November 22, put the plight of grizzly bears in the category of "do or die" situations that the Park Science is facing.

"The grizzly is alive and well in Glacier," he said, "even though public/private planned and existing activities outside the park may have an effect on the grizzly populations."

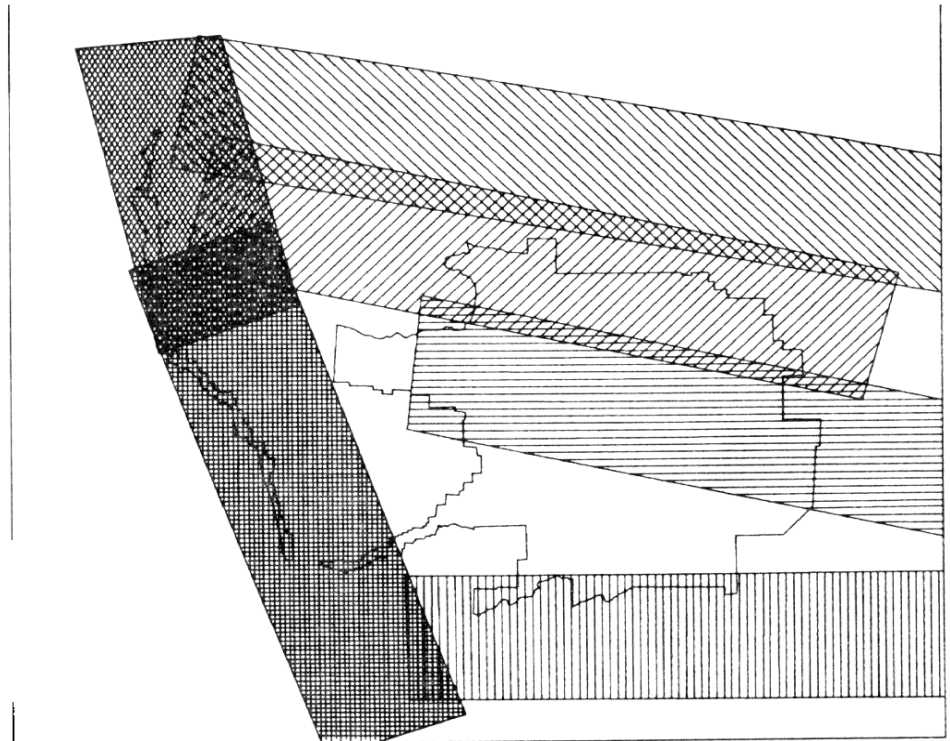
"But the grizzly situation in Yellowstone is desperate. Only about 200 of the animals are estimated to remain there, and we are sure of only about 30 females. It would be an absolute tragedy if irresponsible or thoughtless actions toward the grizzly, in the Yellowstone area, were allowed to wipe out this important population."

distribution and production trends of the bears' key foods.

4. Improvement in our understanding of bear behavior, especially bear reactions to human presence in their habitat, and continued study of the potential for behavioral conditioning of individual bears.

5. Implementation of prototype visitor management packages on an experimental basis to determine if they are effective in reducing confrontations with bears.

Finally, available information permits some judgements and predictions about the future of grizzlies and their management in the park environment. Current population



Olympic NP is shown here as a superimposition of medium scale (between 1:19,500 and 1:60,000) color infrared aerial photography. Each shaded area represents an EROS Data Center "accession" containing a group or series of photographs shot as a single project. The different accessions are distinguished by shading patterns.

status may be described as healthy, with a minimum but increasing human influence. Since park visitation continues to rise, and both confrontations and bear removals correlate with visitation, an expanding human impact on the grizzly population is expected. Reversal of this anticipated trend may not be easy but certainly is within the realm of possibility. Park visitors have been and continue to be a significant element in the management picture. An emphasis on this element holds the greatest promise for breaking the trend of increasing losses.

Park management in the future will be further complicated by expanding development and use of adjacent lands. It's likely that impacts on grizzlies will expand there in much the same fashion as

has occurred in the park. Since many park bears travel to adjacent habitats, it could very well be that the park population suffers from factors beyond direct management control. Thus, our ability to conserve 200 bears is probably an optimistic estimate. A more realistic figure may be closer to 100, a value thought by some authorities to be at below minimum viable population size.

To assure full conservation potential, the park obviously must pursue a regional management plan for grizzlies. Progress toward that goal is being made through the recovery plan. Grizzlies have many human friends and it is that relationship which provides a hopeful light for their future.

Martinka is Supervisory Research Biologist at Glacier NP.

latitude/longitude coordinates. Plotting each accession on a map of its respective Biosphere Reserve is the only way to learn the exact extent of its coverage — information essential for the Parks-As-Islands study. But plotting thousands of accessions by hand is a very labor-intensive process and produces stacks of single-purpose hardcopy maps. We thought that SAGIS (Systems Applications Group Information System), adopted and adapted from the U.S. Fish and Wildlife Service in Fort Collins, might be able to help us with this task.

As always, the most formidable problem was entry. How were we going to get the data into SAGIS? After an initial attempt at hand-coding and hand-entering the data from the computer keyboard (using the printouts previously received), we decided to try to get a tape listing from the EROS Data Center (EDC) in Sioux Falls, SD. Our second attempt was successful and yielded a computer tape containing all the data we wanted... and then some, because our search criteria resulted in many duplicate accessions.

We read the data from the tape into the computer (the Bureau of Reclamation's CDC CYBER) and reformatted them using a program written by Ron Buss, a programmer in the Rocky Mountain Regional Office. Using a CYBER system edit utility, we then separated the master file into 10 separate files, one for each Biosphere Reserve. Using another CYBER utility, we then sorted the accessions within each file so that the duplicate accessions occurred one right after the other in the file. This allowed us to weed out duplicate accessions simply by checking successive numbers.

We then ran a BASIC program I wrote to create "headers" (identifying, coded labels) for each accession and to extract and convert the respective four latitude/longitude coordinates to UTM (Universal Transverse Mercator) coordinates, which SAGIS uses.

We reformatted this output, using our own software, sorted the reformatted output, and assigned sequential header numbers using another package of our own construction. At this point we used UNWAMS (specifically, this means un-Wetlands Area Mapping System, and it is a typical cryptic file name, any of which must be seven characters or fewer in number), a SAGIS utility, to convert the data to a SAGIS mapfile.

Working with the SAGIS mapfile, we use CALPLOT (a computer plotting program) to search and display the accessions for each Biosphere Reserve. For example, one graphic might show the location of all medium-scale (between 1:19,500 and 1:60,000) black-and-white aerial

photography available for Olympic NP for 1953. The Figure here shows how you can use a variety of shading patterns to distinguish between accessions. Colors also are possible using the plotter rather than the black-and-white hardcopy unit.

Using SAGIS in this way allows us to store, locate, and display a large volume of map-based data that otherwise would be difficult and time consuming to handle. Now that the software is written, the process could readily be used for any geographic location. As needs arise, we anticipate applying the technique to other NPS area.

Interpretation Western RAIN Workshop Held

Nearly 150 persons from Oregon, Washington, Idaho, Montana, and Wyoming attended the workshop conducted by the Northwest Region of the Association for Interpretive Naturalists (Northwest RAIN) Oct. 26-29 in Vancouver, Wash. On day one of the workshop, three concurrent sessions ran all day under the general headings "Interpretation in the Private Sector," "Special Populations," and "Shoestring Techniques for a Shoestring Budget." On day two, the conference split into five groups for all-day field trips to Mount St. Helens, Mt. Hood, the Trojan nuclear power plant in Washington, the Columbia Gorge, and the Washington Park complex in Portland, Oregon.

The final day of the conference dealt with Research for Interpretation, interpretive techniques, and a "hot issues panel," in which one of the hottest issues turned out to be the question of volunteerism in the interpretive field and what that movement portends in the way of interpretive professionalism.

Roger Clark with the U.S. Forest Service in Seattle sounded the keynote as the conference opened: "Interpretation in the 1980's: Delivering the Message Through Cooperation," and wildland recreation professor Paul Saunders, from Washington State University, delivered the closing banquet remarks.

Gary Machlis, NPS sociologist from the University of Idaho in Moscow, delivered one of the meatier presentations of the workshop when he addressed a session on "cross cultural interpretation." He described the "myths" and "norms" of various cultures and how human behavior can be inferred to mean certain things by one culture that are not necessarily meant by the people who exhibit these behaviors. "Our myths," he said, "tell us what is right and wrong, good and bad, appropriate or taboo. And "norms" are the informal rules

for behavior — the things that tell us how to act at a football game as opposed to a cemetery. Norms are society's powerful hand, telling us what is polite, what is rude, what is appropriate."

Machlis suggested that interpretation, in order to stand the best chance of transcending cultural gulfs, might best be based on what he called "universals." These universals consist of distinctions that hold in every culture — concepts such as family, stratification, hierarchy, and life cycles. Using "family" as an example, Machlis pointed out a biological fact of human life — that you either have some semblance of a "family" to nurture you from birth until you can cope on your own, or you die.

"So if you start interpreting a historic site by asking 'What do you think family life was like when this fort (or whatever) was built?' the chances are you will reach all the visitors in the audience in some way — at their own cultural entrance level."

Machlis suggested that census data is a classic source for the cultural information on your local scene. Such data can tell you what cultural groups you are dealing with — by sex, by income, by living area, by nationality, and so forth. There is no greater cross-cultural challenge to be faced than the one that is inherent in the United States today, Machlis said. The divisions are deep and cover an enormous range of cultures.

"Consider," he said, "the great cultural gap that exists between some stuffy 25-year-old interpreter and an audience of video game freaks." Then multiply this seemingly frivolous disparity by scores of gaps that occur among urban poor, blue collar, white collar, professional, Southern, Northern, Mexican, black, and all the rest of the pieces that make up the U.S. cultural patchwork. "There is no need to include Japanese, Germans, French, and the rest of the nationalities to define our culture gap problems and opportunities," Machlis said, "but these other nations and their tourists provide us with a growing visitor audience and a growing need for understanding."

He closed by describing one proposed Park Service solution to the interpretation of Ellis Island — to invite each of the national and ethnic groups who had entered the U.S. there in great numbers to supply its own interpretation of what Ellis Island meant to those forebears. "It works out to a sort of market basket approach," he said. "The visitor can browse through the various ideas presented and respond to those that make a connection with his own experience."

And then Machlis tacked on a throw-away line that could serve as the subject for an entire workshop. "Perhaps," he said, "interpreters should be *catalysts* for, rather than *definers* of, the public myths."

Scientists At Rainier Cooperate In 3-Year Study of Elk Impact



Holding the antenna and wearing a techtronics radio locator, Alan Ewert monitors a radio-collared elk.

By Alan Ewert

Elk have always been a subject of great interest to sportsmen and game managers. More recently, the elk of Mount Rainier NP have come under increasing scientific observation because of their impact on park resources. Elk impact has included vegetation reduction, trail erosion and watershed disruption. Park officials are concerned with the adverse effects of a growing population on the fragile park resources.

Traditionally not a native of Mount Rainier, elk from the Yellowstone/Grand Teton localities were transplanted between 1912 and 1933 to areas near the park's boundaries. In accordance with the growing conservation movement at that time, these introduced herds generally were protected from hunting pressures. As early as 1914, small herds of elk were beginning to be seen in the interior of the park.

As with many transplanting operations, this one was not without its problems. By 1934 concern was being voiced about the transplanted elk invading the park to the detriment of other wildlife.

Despite growing populations, little organized research was conducted on elk until after 1962. At that time, during an aerial survey over 466 elk were sighted along the east boundary alone. Because of a variety of human activities, including increasing numbers of clear-cut areas along the park's periphery, elk populations continued to grow in numbers and impact.

To address this mounting problem, the Mount Rainier Deer and Elk Management Coordinating Committee was formed in 1967. Committee members included personnel from NPS, the Forest Service, the Washington State Department of Game, and representatives of Washington State Sportsmen's Council and the Weyerhaeuser Company. Through this

group, research efforts were focused around the total population and characteristics of the park elk, the migration characteristics of the different herds, and the impact on the park's ecosystems.

Currently under the supervision of Stanley Schlegel, Resource Management Specialist, the elk research program is concluding its third year of data collection under the present methodology. Within this particular research design, a combination of vegetative measurement, aerial census, systematic field observation, radio telemetry, and data interpretation using a computer-enhanced analysis of variance procedure is utilized to determine herd size, composition, impact, and migration patterns.

During the winter season, elk were live trapped along various points both inside and immediately outside of park boundaries. After being tranquilized with Pneu-Darts (Succinylcholine Chloride), 20 elk were fitted with radio transmitters. Others were fitted with ear tags and numbered collars. After the taking of appropriate data such as weight, sex, and age, the elk were released. To date, 17 of the original 20 radio-collared elk are being monitored. Using the telemetry equipment and triangulation techniques, elk locations and subsequent movement can be identified readily.

Present evidence indicates that what initially was several small herds living outside the park has grown to a herd of between 1,720 and 2,140 elk, which are taking up summer residence in the park. Subsequent analysis of the vegetative measurements revealed that a significant change has occurred in the floral composition of the sub-alpine meadows, due to trampling and grazing.

Radio telemetry and field observations further substantiated the hypothesis that



Bull elk grazes in a mountain meadow.

ELK (continued)

the elk are using the park's sub-alpine meadows as summer feeding grounds and migrating outside the park during the winter. Elk herd composition data with respect to sex and age ratios are being collected through the combined efforts of the various agencies involved. This year approximately 300 elk were located between September 8 and 9 in an operation involving more than 25 people. The information collected is used by the NPS and the Washington State Game Department.

With Park Superintendent John Rutter's proclamation in 1963 designating the elk situation worthy of NPS consideration, the need for a management scheme became recognized. What makes this particular management problem unique is the interagency approach involving NPS, the Forest Service, the Washington State Game Department, the Washington State Sportsmen's Council, and other concerned groups. Despite sometimes competing management objectives, a spirit of information sharing and fact finding has become a dominant feature. At least once a year, the above organizations convene to review publicly the results of NPS research and share any new ideas.

From these meetings, management alternatives have been developed. Currently, those considered most feasible include:

1. Take no action on the part of the NPS.
2. Direct reduction by shooting of elk herds within the park.
3. Reduce elk numbers through sport hunting outside park boundaries.
4. Manipulate the elk in areas of population concentration, by means such as reducing the herd "memory."

Any management alternative chosen will be faced with the constraints of public acceptance, cost factors, and technical feasibility. Likewise, an effective management scheme must involve the tertiary process of identification, data collection, and decision-making. Currently, the NPS at Mount Rainier is involved in the data collection stage of this process.

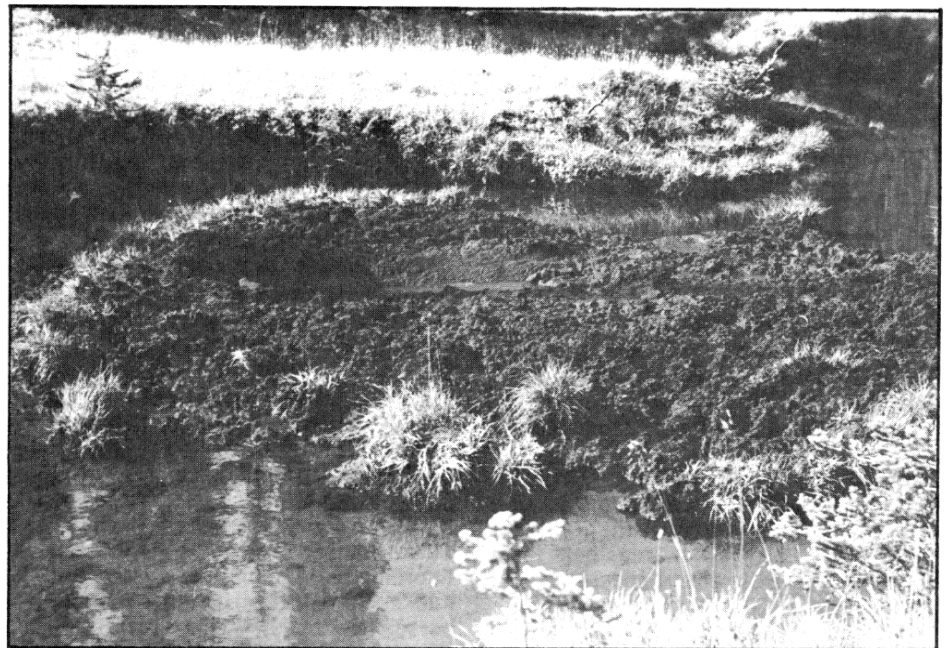
In a larger sense, the elk situation at Mount Rainier is indicative of a growing sophistication within the NPS concerning resolution of difficult management problems. Despite differing management goals, the NPS has sought out potentially involved agencies and asked their opinions, so that together they could formulate an acceptable management scheme for all concerned parties.

Perhaps of even more importance than effective solution to the current elk

situation at Rainier is the fact that consultation has replaced confrontation among various governmental agencies. A long-range commitment has been made to research and data-gathering as opposed to quick decisions based on gut-level instincts. In an age where the National Parks no longer are islands unaffected by events outside park boundaries, a

cooperative effort among involved agencies and groups can provide better protection of our park resources for future generations, and serve as an effective model for future situations of a similar nature.

Photos by James E. Mills. Ewert and Mills are Resource Management Specialists at Mount Rainier NP.



Elk Wallow from a distance (above) dominates the meadow. Seen up close (below) the same wallow shows the elks' devastating, bulldozer effect.

information crossfile

An effort to improve the gene pool of the last remaining species of pure wild horse by U.S. and Soviet conservationists appeared in the August/September issue of the *U.S. Fish and Wildlife News*. The two countries exchanged six rare Przewalski's horses in July in a swap negotiated under the U.S. — U.S.S.R. Environmental Agreement. One male and two female horses from the Bronx and San Diego Zoos left for Moscow in mid-July 1982, their destination being Russia's Askaniya-Nova Wildlife Preserve. Their counterparts from the Russian preserve arrived in New York City in late July.

Only 420 of the Mongolian wild horse species survive, all of them in zoos. None has been seen in the wild since 1968. The improved genetic mix hoped for from the horse exchange could improve the chances for eventual reintroduction in Mongolia.

The distinguished and much-honored career of Jack Major, with special emphasis on his many contributions to the research and input needed to manage the National Parks of the Sierra Nevada are detailed in an article by David J. Parsons in the Oct. 12, 1982 issue of *Madrono*, Vol. 29, No. 4, pp. 220 - 6.

"The Role of Plant Ecological Research in Sierran Park Management: A Tribute to Jack Major," is the title of the piece, by the Kings Canyon/Sequoia NP research scientist. "His (Major's) interest, as well as that of his students and associates, in the plant ecology of the Sierra Nevada has contributed to a basic understanding of the vegetation, which in turn provides a basis for effective resources management throughout the Sierra," Parsons wrote.

Examples of Major's research contributions include impacts of fire suppression and grazing, and subalpine and alpine vegetation studies. Parsons points out the NPS asset (eventually formalized through establishment of a Cooperative Park Studies Unit at the University of California, Davis, where Major taught) that Major represented — "valuable consultation and inspiration to countless undergraduate as well as graduate students of his colleagues both at U.C. Davis and elsewhere."

Major retired in 1981.

Any scientist or interpreter wishing to communicate scientific information to the general public and thirsting for examples of excellence in this genre will find a superlative piece in the December issue of

Science 82 — Jack Page's monthly essay — this one entitled "A Tree for All Seasons." As the subhead reads, "Besides providing beauty, music, and symbolism, trees also perform some inspiring biological feats." Page details these feats in admirable language, satisfying science without talking down to the public.

A by-line article by Robert and Patricia Cahn in the Oct. 13, 1982 issue of *The Christian Science Monitor* describes the way nations seeking to set aside new national parks are being challenged to manage their natural areas in ways that will help meet the people's needs for firewood, food, jobs, and other necessities.

"But will such new protected areas really be national parks in the century-old tradition of Yellowstone?" the Cahns ask. The question stems from the third once-a-decade World National Parks Congress held in October in Bali, Indonesia.

For the first time since 1917 a new species of duck has been discovered — this time off the coast of Argentina, according to the *Pennsylvania Games News*. Named the white-headed flightless streamer duck, *Tachyeres leucocephalus*, the duck runs across the water, appearing like a small sidewheel steamboat.

In his November 22 appearance before an Oregon State University audience at Corvallis, NPS Director Russell E. Dickenson described the way an artificial seaweed (called Seascape) seems to be extending the 112-year-old Cape Hatteras lighthouse's lease on life.

The 208-foot lighthouse — the nation's tallest — has been endangered many times in the past five decades as the Atlantic ocean's forces have alternately taken away and given back vital portions of the lighthouse's land base.

In 1980, Bill Garrett, a Du Pont engineer, patented his invention and in May 1981 he began the installation of the artificial seaweed, now anchored in the sand 300 feet offshore in rows parallel to the beach. Since then, the beach has given some evidence of build-up, and it is Garrett's contention that the synthetic fronds have acted much like real seaweed and caused the sand-laden surf to drop its load.

Garrett donated 1,000 units of the seaweed; 5,000 additional units were paid for by the Save The Lighthouse Committee of North Carolina, co-chaired by Senator Jesse Helms and Governor James Hunt and ably directed by Hugh Morton of Grandfather Mountain fame.



RUSSELL E. DICKENSON, Director
National Park Service
U.S. Department of the Interior

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- "Expectations of Science and Scientists"
by Daniel J. (Jim) Tobin, Jr.
- "Colorado Tick Fever"
by Andrew B. Carey
- "Kudzu Eradication in Southeast Parks"
by Susan Power Bratton
- "NPS Jackson Hole Research Center"
by Karl Harper
- "Protecting Mountain Meadows: A Grazing Management Plan"
by Steven DeBenedetti and David J. Parsons

Cover photo:

Resource Management Trainees start their stints: *(see story p.3.)*

Front row (lt. to rt.): Bill Ehorn (Channel Islands Supt.); Debbie Buzzell (Morristown + Roosevelt-Vanderbilt); Norm Fletcher (Acadia); Brad Cella (Wrangell-St. Elias); Garree Williamson (Cuyahoga); Walter Loope (Pictured Rocks); Tim Tunison (Hawaii Volcanoes); Jack Galvin (Yellowstone); Stan Lock (NCR Coordinator); Ro Wauer (WASO Coordinator); Jon Jarvis (Crater Lake); John Miller (Grand Canyon); Jeff Conner (Canyonlands); Allan O'Connell (Fire Island); Joanne Michalavic (Mt. Ranier).

Center row (lt. to rt.): Ed Schreiner (Olympic); Hank McCutchon (RMRO); Steve Budd-Jack (Mesa Verde); Steve Chaney (Buffalo River); Ken Stephens (Bandelier); Bruce Rogers (Assateague); Bob King (Padre Island); Dave Reynolds (New River Gorge); Kathy Jope (Katmai); Chris Baumann (C + O Canal); Barbara Samora (Cape Cod); Jeff Bradybaugh (Theodore Roosevelt); Ron Nagata (Haleakala); Frank Buono (Chaco); Len Frank (NAR Coordinator); Steve Cinnamon (Waputki-Sunset Crater); Gary Ahlstrand (Alaska Coordinator).

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